



WARZYN ENGINEERING INC.
REMEDIAL INVESTIGATIVE ACTIVITIES
CITY OF STURGIS WELL FIELD, STURGIS, MICHIGAN
HEALTH AND SAFETY PLAN

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Project: City of Sturgis RI/FS Project
Project Number: C12686.00
Location: Sturgis, Michigan
Proposed Date of Work: August 1987 through November 1987

SECTION ONE: SITE CHARACTERISTICS

General Project Description: The field work for this project involves the Remedial Investigation of several wells in the City of Sturgis municipal water supply. Field tasks include:

- Industrial site survey
- Existing well sampling
- Soil gas survey
- Monitoring well installation
- Surface water and sediment investigation
- Groundwater sampling and aquifer testing
- Groundwater level monitoring
- Topographic survey

Site Description: The site consists of the aquifer supplying the City of Sturgis well field, especially that portion that supplies (or supplied) the Layne, Jackson and Kirsch wells (PW-1, -2, and -3). The Layne and Jackson wells are located near the center of Sturgis. The Jackson well was adjacent to the Layne well, but was abandoned. The Kirsch well is on the west side of the city.



Site History: Routine monitoring of municipal water supplies by the Michigan Department of Public Health in 1982 revealed that the Jackson and Layne wells were contaminated by low levels of trichloroethylene (TCE) and tetrachloroethylene (PCE). In April 1984, the City halted use of these wells and increased pumpage from three others. In January 1985, TCE was detected in the Kirsch well. Since that time, the Jackson well has been abandoned, the Layne well has not been used, and the Kirsch well has been used on only a limited basis. No source of the groundwater contamination has yet been determined.

Site Features:

Topography: General slope from the northeast to the south and southwest

Buildings: Numerous; urban area

Surface Water: Lakes north and west of the city; the Fawn River is southeast of the city

Utilities: Numerous; gas, electric and telephone

Area Population: Urban, about 10,000; minor industry

Principal Hazardous Materials Known or Suspected:

The principal hazardous materials of concern include the following Volatile Organic Compounds (VOCs):

<u>Chemical</u>	<u>Maximum Detected Concentration (ug/l)</u>		
	<u>Jackson Well</u>	<u>Layne Well</u>	<u>Kirsch Well</u>
Tetrachloroethylene	3	0	0
Trichloroethylene	152	43	6

SECTION TWO: CHEMICAL HAZARD INFORMATION

TABLE 1: CHEMICAL PROPERTIES

<u>Name</u>	<u>Specific Gravity</u>	<u>Flash Point</u>	<u>Flam. Limits</u>	<u>Vapor Press.</u>	<u>Vapor Den.</u>	<u>Ionization Potential</u>	<u>Solubility</u>
Tetrachloroethylene	1.63	Not Combustible		14mmHg	5.83	9.32 eV	0.015%
Trichloroethylene	1.46	89.6°F	11-41%	58mmHg	4.53	9.47 eV	0.1%

TABLE 2: HEALTH PROPERTIES

<u>Name</u>	<u>Odor Characteristic</u>	<u>Threshold</u>	<u>TLV</u>	<u>IDLH</u>	<u>Dermal Toxicity</u>	<u>Approved Respirator Cartridge</u>
Tetrachloroethylene	chloroform-like	4.7 ppm	50 ppm	500 ppm	moderate	organic vapor
Trichloroethylene	chloroform-like	21.4 ppm	50 ppm	1000 ppm	skin irritant	organic vapor

SECTION THREE: TASK EVALUATION

A. Subtask Analysis

The field investigation includes the following subtasks, with specific hazards and levels of protection for each subtask.

Subtask 3.1 Industrial Site Survey

Level E

Within the study area there are numerous industries both operating and closed which may have used TCE or other solvents in the past. During the site investigation phase, field sampling will be conducted on many of these potential source areas to determine whether individual sites are sources of VOCs. Prior to initiating site investigations at the relatively large industrial plants, a plant survey will be conducted with the cooperation of each industry. The intent of the surveys is to view the operations of the plants, and determine where solvents have been stored, used or disposed on the plant grounds, both under current operations and historically.

The surveys are currently planned to be conducted at the Sturgis Foundry, the Kirsch Company, Kirsch Municipal Airport, the Frye Printing Company, United Paper and the Bandholtz Paint Manufacturing Company. Others may be included based on discussions with local residents. The site surveys will be conducted by the project engineer and the hydrogeologist who will be conducting the site investigation.

Hazards other than those provided by normal field operations are not anticipated. Appropriate Level E personal protective equipment, i.e. hard hats, safety glasses, steel toed boots, will be worn as required by site specific protocols.

Air monitoring will not be included for this subtask.

Subtask 4.2 Existing Well Sampling

Level D or C Protection

Selected existing monitoring wells (10), test wells (2), and production wells (11) will be sampled for water quality. Purge water from the wells will be collected for discharge to the City wastewater treatment plant.

The potential for dermal contact with dissolved chlorinated solvents exists, and should be kept to a minimum by the use of dermal protection and eye and face protection (level D). If air monitoring indicates vapor concentrations of the solvents above the designated action levels, air purifying respirators should be utilized (level C).

Air monitoring will be performed during well purging with a photoionization detector (PID). The action level for upgrade to level C is any persistent reading in the sampler's breathing zone greater than 5 ppm over background level (as ppm benzene).

Subtask 4.3 Soil Gas Survey

Level E Protection

Soil gas sampling will be conducted at an estimated 14 locations. Eighty-two soil gas samples will be collected to evaluate potential sources listed in the table below.

TABLE 4-1
SOIL GAS SAMPLING LOCATIONS

<u>Location No.</u>	<u>Name/Type of Business</u>	<u>Total Number of Samples</u>
1	Sturgis Tool and Die, Inc. 817 Broadus; 313 Susan Ct. (Metal Fabrication)	2
2	Kirsch Company 309 Prospect, 400 E. Hatch (Metal Fabrication)	15
3	Diamond Gear and Engineering 203 Ulm Street (Metal Fabrication)	3
4	Losinski Mold-Tool and Die 925 Clay Street (Metal Fabrication)	2

5	Sturgis Foundry Corporation 800 and 100 W. West St. (Foundry)	15
6	Parma Tube Corporation and Parma Tube lot behind 1008 W. Progress St. (Metal Fabrication)	3
7	Wade Electrical Products Company 211 Jacob St. (Electrical Parts, Solvent Distribution)	5
8	City Park West Power Plant (Possible former disposal site) 200 Blk. W. Chicago Road	4
9	Transogram-Midwest, Inc. 501 Jacob Street (Plastics and Metal Fabrication)	4
10	J&W Products, Inc. 807 W. West Street (Metal Fabrication)	3
11	Sturgis Electric Motor Service 703 N. Centerville Road (Motor repairs, metalizing)	2
12	United Paper Company 1 United Drive (Paper Products)	5
13	Bandholtz Paint Mfg. Co. 121 N. Nottawa St. 106 Pleasant Avenue (Paints and Solvents)	9
14	Area of McKee and Centerville Rd Numerous Metal Fabricators	10
Total Number of Samples		82

Soil gas sampling will consist of driving a probe to a depth of approximately 3 ft, purging the sampling probe and tubes and collecting a sample in a glass gas sampling vial. The locations of utilities are to be determined prior to driving probes into the ground at each location. The samples will be returned to the on-site GC for analysis. Sample blanks will be collected between

facilities being surveyed. Results of the soil gas analyses will be plotted and used to evaluate each facility as a potential VOC source, to locate additional soil gas samples, if needed, and to identify areas where direct groundwater sampling is required. Soil gas sample locations may also be dependent on the results of water quality analyses of samples collected during drilling.

Physical hazards involved with driving and removing the soil probes must be addressed by careful work practice on the part of sampling personnel.

Air monitoring is not anticipated for this subtask.

Subtask 4.4 Monitoring Well Installation

Level D and/or C Protection

Eighteen wells at 11 locations will be installed. Three drilling rigs will be required for 40 field days of drilling. Each drilling rig will be supervised by a geologist. Eighty-one water quality samples will be collected and analyzed during drilling; samples will be screened for VOC contamination.

Well drilling will be performed utilizing two methods: hollow stem auger for shallow depths and rotary wash with clear water for greater depths. These methods allow the collection and sampling of groundwater during drilling. Additionally, soil samples will be collected from deep borings; the deep borings will also be logged with a natural gamma ray logging instrument.

Well development will be performed by forced air for deep wells and by bailer for shallow wells.

In addition to the chemical hazards involved with contact of contaminated soils and groundwater, personnel must address the physical hazards of operating machinery. Professional caution, especially with regard to the limitations presented by protective equipment, must be stressed for personnel engaged in drilling operations.

Personal protection will be guided by air monitoring with a PID of the drilling crew's breathing zones. Operations may begin in level D protection. Upgrade to level C (breathing zone PID readings greater than 5 ppm over background levels but less than 100 ppm over background) may be necessary as the borehole is advanced. Upgrade of personal protection may be necessary as an interim measure in some situations; if PID readings show a persistent return to below action levels, work may proceed in level D, with upgraded protection at stand by.

Subtask 4.5 Surface Water and Sediment Investigation

Level E Protection

Eight surface water and eight sediment samples will be collected from a gravel pit, a disposal pit, and two non-contact effluent discharge points. Surface water samples will be collected using stainless steel sampling equipment; sediment samples will be collected using a hand corer.

Hazards concerned with working over water need to be addressed. Personnel should operate from a stable base. If necessary, a flat bottom boat with adequately high bulkheads to prevent overturn should be used. Personnel must wear U.S. Coast Guard approved personal flotation devices and have adequate boat safety equipment (anchor, oars or paddle, whistle or horn). Sampling equipment should be secured by line to the boat to prevent its loss overboard.

Air monitoring is not anticipated for this subtask.

Subtask 4.6 Groundwater Sampling and Aquifer Testing

Level D and/or C Protection

Thirty-five monitoring wells, three test wells, and eleven and five production wells will be sampled and analyzed on each of two rounds of groundwater sampling. Purge water from the wells will be collected for discharge to the City wastewater treatment plant.

Hydraulic conductivity tests will be performed on 20 wells at the time of the first sampling round. Methods used will include air pressure for piezometers and water slug removal for water table wells.

The potential for dermal contact with dissolved chlorinated solvents exists, and should be kept to a minimum by the use of dermal protection and eye and face protection (level D). If air monitoring indicates vapor concentrations of the solvents in excess of the action level, air purifying respirators should be utilized (level C).

Air monitoring will be performed during well purging with a photoionization detector (PID). The action level for upgrade to level C is any persistent reading in the sampler's breathing zone greater than 5 ppm over background (as ppm benzene).

Subtask 4.7 Groundwater Level Monitoring

Level E Protection

Groundwater level monitoring will be conducted on four occasions to determine changes in groundwater flow. Water levels will be measured using a fiberglass tape and sounding device or an electronic water level indicator. Measuring devices will be decontaminated with a deionized water rinse between monitoring wells. Air monitoring is not anticipated for this subtask.

Subtask 4.8 Location and Elevation Survey

Level E Protection

A location and elevation survey of monitoring and production wells will be performed by Warzyn's surveyors during the site investigation. Air monitoring is not anticipated for this subtask.

B. Levels of Protection

As established by U.S. EPA's Standard Operating Safety Guide, the levels of protection for workers are based on range of concentration of airborne organic vapor contamination. The following describes levels of protection which will be implemented during the site investigation activities.

Level E

Level E is to be implemented when work activities (e.g., general site investigation, site set-up) take place where there are no anticipated or known environmental health hazards. Level E may include the following:

- Steel toe boots
- Hard hat
- Surgical gloves (when needed)
- Coveralls
- Participation in medical monitoring program and Health and Safety trained, according to OSHA 29 CFR 1910.120

Level D

Level D is to be worn during activities which do not suggest any initial respiratory protection, but where dermal protection is warranted. The following list outlines the personal protective equipment to be utilized for Level D:

- Polyethylene (PE) coated tyvek coveralls
- Steel toe/steel shank leather work boots with latex overboots or steel toe/steel shank neoprene boots;
- Surgical gloves
- Nitrile or neoprene gloves
- Eye protection (safety glasses or face shield)
- Hard hat

Level C

Level C is to be worn when work area organic vapor air contamination is between 5 ppm and 100 ppm greater than background (according to the HNU or OVA readings). The following items are included in this level of protection:

- PE coated tyvek coveralls
- Steel toe/steel shank leather work boots with latex overboots or steel toe/steel shank neoprene boots;
- Surgical gloves
- Nitrile or neoprene gloves
- Full face, air purifying respirator with combination organic vapor/dust and mist cartridge
- Hard hat

C. Decontamination Procedures

Personnel Decontamination

A decontamination line will be established at work site locations, in coordination with the site safety officer. The decontamination line will be set up such that no cross contamination will take place when disposing of contaminated personal protection equipment. Decontamination procedures should be followed, including washing hands and face upon finishing field investigative activities.

Drill Rig and Related Equipment Decontamination

Steam cleaning the drilling rigs between boreholes will be conducted at each well location. The steam cleaning water from the drill rigs is anticipated to have very low or no contaminants because of the low concentrations present in the groundwater. Therefore, the steam cleaner water discharge will be contained only to minimize nuisance. At sites where significant concentrations (equipment exhibiting PID readings greater than 5 ppm over background levels) are observed in the split spoon samples, through HNU or OVA screening, an attempt will be made to contain the water for disposal to the City sanitary sewer system. Decontamination will take place at either of two locations selected to allow treatment of water by the City wastewater treatment plant.

Sampling Equipment Decontamination

Sampling equipment, such as stainless steel bailers, will be decontaminated between locations with a solution of water and TSP detergent. Equipment will be rinsed with deionized water. Decontamination fluids will be discharged to the City sanitary sewer system.

D. Investigation-Derived Wastes

Uncontaminated boring cuttings, borehole wash water and bagged disposable protective equipment will be disposed in locations determined by City officials. Disposal of materials determined by PID readings to be contaminated is the responsibility of the Michigan Department of Natural Resources (MDNR). Drilling crews will contain and secure these materials in 55-gallon drums and leave the drums in place for the MDNR.

SECTION FOUR: Emergency and Resource Information

A. Chemical Exposure Symptoms:

Vapors of TCE and PCE are irritating to the eyes, nose, and throat. If inhaled in high concentration, they can cause difficult breathing, nausea or dizziness.

Liquids containing these solvents can be irritating to the eyes and skin. If swallowed, they may produce nausea.

B. First Aid Treatment

For vapor exposure, remove victim to fresh air. If breathing has stopped, begin artificial respiration.

For liquid exposure, remove contaminated clothing and flush affected skin with plenty of water. If in eyes, hold eyelids open and flush with plenty of water. If swallowed and the victim is conscious, have him drink water or milk and induce vomiting. If swallowed and the victim is unconscious, do nothing on-site except keep him warm. Obtain qualified medical assistance.

C. Resources:

<u>Service or Organization</u>	<u>Location</u>	<u>Phone Number</u>
Hospital: Sturgis Hospital	Sturgis, WI 916 Myrtle Ave.	616-651-7824
Fire Department:	Sturgis, WI	616-651-1755
Poison Control Center:	Coldwater, MI	517-279-7935
Police:	Sturgis, WI	616-651-3231
Rescue/Ambulance:	Parker Ambulance Service Sturgis, WI	616-651-6555
Warzyn:	Madison, WI	608-273-0440
H & S Director Don Woods	Chicago, IL (Home) (Pager)	312-773-8484 [REDACTED] 312-303-8335
Project Manager: Ken Quinn		608-273-0440
Client Contact: Steve Luzkow		517-335-3392

D. Hospital Route: From any location, go north or south to Chicago Avenue (U.S.12). Go east on Chicago to Lakeview Ave. Go south (right) on Lakeview Ave. 0.5 mi. to the hospital, on the east (left) side of the street at Myrtle Ave.

Personnel should ascertain that this route is available prior to the beginning of field activities.

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